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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/698,899
Filing Date: October 31, 2003
Appellant(s): DAMERA-VENKATA, NIRANJAN

____
Edouard Garcia
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 09/09/2008 appealing from the Office action mailed *04/09/2008**.

1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments

The appellant's statement of status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 5,710,636	Curry	01-1998
US 7,218,420	Tai	05- 2007
US 5,337,361	Wang	08-1994

US 6,512,596	Lapstun	01-2003
US 6,252,971	Wang	01-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 1-11 and 21-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With respect to claims 1 and 21, limitation recites, " <u>wherein ones of the output halftone image blocks associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks and ones of the bits having the second value are derived from respective ones of the graphical code word symbols"</u> (emphasis added by applicant), in which the underlined limitations are not disclosed in the original specification. Claim 21 cites identical limitation as claim 1. Thus

both claims 1 and 21 are rejected under 35 U.S.C. 112, first paragraph. The closest descriptions found in the original specification are paragraphs 31, 33 and 42.

> Par. 31, recites, "Code words are generated by a code word sequence generator 360 from embedded data 210. In one embodiment, this merely involves using embedded data 210 directly, bit by bit. In another embodiment, error checking coding is added to embedded data 210 first, before being converted to code words. In yet another embodiment, data 210 is compressed before being translated into code words by a code word sequence generator 360. The code word sequence generator 360 utilizes the incoming data to produce graphical symbols which correspond to the code words. At logic stage 350, when a bit from halftone bitmap 310 corresponding to the spatial location of halftone image data o(m) is b(m)=l, then a symbol corresponding to a code word is generated and the output is set to that symbol. More than one symbol may be used to represent a single code word as long as the code word is uniquely encodable from the symbol alone. The output from logic stage 350 is assembled into encoded halftone image 390, which corresponds to output 230."

Par. 31 (also, refer to Fig. 2A for embedded data 210 and output 230, and refer to Fig. 3 for code word sequence generator 360, logic stage 350 and halftone bitmap 310) is about generating code words. There is no functional structure elements, steps, or processes supporting the features of "<u>respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks</u>" and "<u>and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols</u>" (emphasis are added by the examiner)as claimed in the invention of claims 1 and 21 in the original disclosure.

> Par. 33, recites, "In one embodiment, logic stage 350 may also contain additional logic that causes the test of b(m) to be skipped when the input block x(m) meets certain requirements, such as meeting certain minimum or maximum intensity thresholds, whereby the modified input image block is passed through to the output of logic stage 350. This may be done to improve the visual quality of the resultant encoded halftone image, as well as to reduce the accumulation of quantization errors in the resultant halftone image which occur when the code word block symbols are significantly different from the modified input image blocks in terms of average intensity value."

Par. 33 is about skip of testing b(m) by the logic stage 350 when the input block x(m) meets certain requirements such meeting certain minimum or maximum intensity

thresholds. The structure elements disclosed in Figs. 2A and 3 are for a encoding process of encoding, or embedding a code word into an input image. Again, there is no functional structure elements, steps, or processes supporting the features of "respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks" and "and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols" (emphasis are added by the examiner) as claimed in the invention in claims 1 and 21 in the original disclosure.

> Par. 43, recites, "In code word extraction stage 430, each relative bit of binary bitmap 450 is tested to see if it is a data indicator bit (e.g. value of 1) or an image indicator bit (e.g. value of 0). If it is an image indicator bit, the related sub-matrix of the aligned and corrected input image 250 is ignored or used to reconstruct the image (431); if it is a data indicator bit, then the image sub-matrix is passed to probabilistic analysis stage 440. In one embodiment, code word extraction stage 430 may also contain additional logic that causes the test of b(m) from bitmap 450 to be skipped when the input block meets certain requirements, such as meeting certain minimum or maximum intensity thresholds, whereby the modified input image block is simply ignored as it is known to not be a data block."

Par. 43 (also, refer to Fig. 2B for input image 250, and refer to Fig. 4 for binary bitmap 450, extraction stage 430) is about code word extraction. The structure disclosed in Figs. 2B and 4 is for extracting a code word from the input image 250. Again, there is no functional structure elements, steps, or processes supporting the features of "respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks" and "and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols" (emphasis are added by the examiner) as claimed in the invention of claims 1 and 21 in the original disclosure. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

Regarding claim 3, recites, "wherein <u>the determining comprises producing the bitmap by halfloning a contone patch of the graylevel value</u>" (emphasis added by applicant), which is not disclosed in the original specification. The only description found in the original specification is Par. 13.

> Par. 13, recites, "As shown in the drawings for purposes of illustration, the present invention is embodied in a method of processing a continuous tone image. The method includes using a halftone screen to generate a bi-level bitmap; partitioning the contone image into an array of image blocks; halftoning the image blocks; using the bi-level bitmap to select some of the halftone image blocks; and modifying the selected halftone image blocks using code words, such that information contained in the code words is embedded in a halftone image. The information may be embedded at a rate that is linked to a graylevel of a contone patch. **<u>The bitmap may be produced by halftoning the constant patch of the graylevel</u>**. The graylevel is determined by a coding rate." (emphasis is added by the examiner)

However, merely cites "The bitmap may be produced by halftoning the constant patch of the graylevel" without functional structure elements, steps or processes disclosed in the disclosure to support the feature of "wherein <u>the determining comprises producing the bitmap by halfloning a contone patch of the graylevel value</u>" is not considered an adequate written description of the claimed invention as claimed in the invention of claim 3. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

Claims 2-11 are dependent claims to claim 1 and are rejected for the same reason discussed in the rejection of claim 1 in this section.

Claims 22-28 are dependent claims to claim 21, and are rejected under 35 U.S.C. 112, first paragraph for the same reason in the rejection of claim 21 in this section.

In addition, Applicant amended claims 1-9 and 21-28 with new features and failed to comply with 37 CFR 1.173 for not to disclose any support of claim changes. 37

U.S.C. 1.173(c) requires that “Whenever there is an amendment to the claim pursuant to paragraph (b) of this section, there must also be supplied, on pages separate from the pages containing the changes, the status (i.e. pending or canceled), as of the date of the amendment, of all patent claims and of all added claims, and an explanation of the support in the disclosure of the patent for the changes made to the claims”. Applicant failed to provide “an explanation of the support in the disclosure of the patent for the changes made to the claims”.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-11, 18, 28 and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant failed to particularly point out how and in what extent the derivation of values from "contone image block" and "graphical code word" discussed in the claim rejection under 35 U.S.C. 112 first paragraph. Claims 2-11 are dependent claims to claim 1 and are rejected under 35 U.S.C. 112, second paragraph for the same reason discussed in the rejection of claim 1 in this section. The examiner will give a reasonable broadest interpretation for " <u>wherein ones of the output halftone image blocks associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks and ones of the bits having the second value are derived from respective ones of the graphical code word symbols”</u>.

Claim 18, 28 and 38, limitation recites, “using the set of probability parameters to select the most a likely sequence of graphical code word symbols” in which applicant failed to particularly point out whether "the set of probability parameters to select a sequence of graphical code word symbols” because the word “likely” used in the claim language is an uncertain word.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-7, 10-11 and 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US 5,710,636) in view of Tai et al (Tai) (US 7,218,420) and further in view of Wang et al (Wang) (US 5,337,361)

Regarding claim 1.

Curry’ 636 discloses A method of processing a contone image, the method comprising: determining a bi-level bitmap of bits from a graylevel value (**e.g. Curry discloses an image generation system of Fig. 1 that halftone image, such as the halftone image disclosed in Figs. 3 and 4, is generated based on grayscale image data and bitmap codes, col 3, line 37 to col 4, line 5; grayscale image data, e.g. a 8-bits at 0-255 different intensity and a halftone image is a binary image are well**

known in the art; bitmap codes are generated based on a desired pattern to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45; the purpose of having bitmap code generated from pattern in the processing of encoding is to encode the data either by the presence or absence of marks at a sequence of spatial locations, col 1, lines 46-50; thus, bitmap code is a bi-level bitmap of bits and is determined from a graylevel value for either is "presence" or "absence" of marks in order to match the grayscale input images), wherein each of the bits has a respective one of either a first value or a second value (**e.g. each bit has a respective value of either "presence" or "absence", or, "1" or "0" discussed above, col 1, lines 46-50 and col 4, lines 57-65**); partitioning the contone image into an array of contone image blocks (**e.g. Curry discloses sample values or blocks or cells of grayscale input images from image generator 12 of Fig. 1 are transformed by halftone generator 14 of Fig. 1 into halftone dot patterns, which are written into a spatially, periodic, two-dimensional array of halftone cells and this is how the halftone cells are produced; giving sample values being transformed into halftone dot patterns, the input contone image must be partitioned into blocks or cells or sample values in the halftoning process of Fig. 1, col 3, lines 37 to col 4, line 5**); generating (**e.g. forming**) a sequence of graphical code word symbols (**e.g. the human readable dot pattern 29 of Fig. 3 may be text, graphics, numbers etc. and is formed by three types of halftone cells, e.g. halftone cells 20, 22 and 24, col 4, lines 45-56**); and producing blocks of an output halftone image (**e.g. halftone cells 20, 22 & 24 of Fig. 3**)

from ones of the contone image blocks (**e.g. blocks or cells or sample values of grayscale input images discussed above**) and ones of the graphical code word symbols (**e.g. the letter “R” of Fig. 3**) in accordance with the values of respective ones of the bits of the bi-level bitmap (**e.g. the “1”s and “0”s of bitmap codes discussed above, col 1, lines 46-50 and col 4, lines 57-63**), wherein ones of the output halftone image blocks (**e.g. halftone cells 20, 22 & 24 of Fig. 3**) associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks (**e.g. the bit values, “1"s or "0"s are derived based on the presence or absence of marks of the contone image blocks, or cells, or sample values discussed above, col 1, lines 46-50**) and ones of the output halftone image blocks associated with respective ones of the bits having the second value are derived (**e.g. generated**) from respective ones of the graphical code word symbols (**e.g. bitmap codes are generated based on a desired pattern or “the graphical code word symbols” to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45, and to encode the data either by the presence or “1” ,or absence or “0” of marks at a sequence of spatial locations, col 1, lines 46-50 discussed above**).

Curry does not explicitly disclose partitioning the contone image into an array of contone image blocks <u>in detail</u> (“in detail” is added by the examiner); and generating a sequence of graphical code word symbols <u>encoding information</u>, (emphasis added by the examiner).

In particular, Tai' 420, the same field of endeavor also discloses in detail about partitioning (**e.g. creating**) the contone image into an array of contone image blocks (**e.g. Figs. 6A-C & Figs 21-1 through 21-5 teach forming arrays or matrices of rectangle blocks or "Bricks", col 8, lines 6-16 & col 10, lines 29-57)**; and

In the same field of endeavor, Wang' 361 discloses generating (**e.g. composing)** a sequence of graphical code word symbols <u>encoding information</u> (**Wang' 361 discloses "a sequence of graphical code word symbols encoding information" such codeword structure of PDF417, Figs. 1 & 2, col, 5, line 56 to col 7, line 60, and encoding/decoding processes in col 7, line 63 to col 8, line 58, and so on**).

Having a method of processing a contone image of Curry' 636 reference and then given the well-established teaching of Tai' 420 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of processing a contone image of Curry' 636 reference to include partitioning the contone image into an array of contone image blocks as taught by Tai' 420 reference since doing so would improve image reproduction quality by smoothing image to eliminate jagged edges (col 13,lines 29-34, Tai, 420) with a predictable result; and then to modify the combination of Curry' 636 and Tai' 420 to include generating a sequence of graphical code word symbols <u>encoding information</u> as taught by Wang' 361 since doing so would greatly increase the versatility of the method of processing a contone image of Curry' 636 reference for generating quality sound graphical code word symbols for encoding and therefore to improve the validation of a finished image, and

further the technique provided could easily be established for one another with predictable results.

Regarding claim 2, in accordance with claim 1.

Curry discloses wherein determining comprises determining the bitmap based on the graylevel value (**as discussed above in claim 1, e.g. Curry discloses that halftone image, such as the one disclosed in Figs. 3 and 4, is generated based on grayscale image data and bitmap codes as disclosed in Fig. 1; grayscale image data, a 8-bits at 0-255 different intensity and halftone image is a binary image are well known in the art; bitmap codes are generated based on a desired pattern to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45; the purpose of having bitmap code generated from pattern in the processing of encoding is to encode the data either by the presence or absence of marks at a sequence of spatial locations, col 1, lines 46-50; thus, bitmap code is a bi-level bitmap of bits and is determined from a graylevel value for either is "presence" or "absence" of marks in order to match the grayscale input images**).

Regarding claim 3, in accordance with claim 2.

Curry discloses wherein the determining comprises producing the bitmap by halfloning a contone patch of the graylevel value (**e.g. refer to Fig. 1, grayscale image data is generated by image generator 12 and halftone cells are produced from dot patterns by the halftone generator 14, col 3, lines 47-48; in order to use bitmap code, which is produced from a desired pattern by bitmap generator 10, both the**

halftone image and halftone cells must be in a bitmap form for bits to be "1" if a mark is presented and "0" if a mark is absence, col 3, lines 37-45 & col 4, lines 57-65).

Regarding claim 4, in accordance with claim 1.

Curry does not explicitly teach wherein the determining comprises selecting the bitmap is selected from a set of bi-level bitmaps.

Tai' 420 teaches wherein the determining comprises selecting the bitmap is selected from a set of bi-level bitmaps **("bi-level bitmap", or binary bitmap, either is fully exposed or unexposed, refer to Fig. 1, bitmap selected to input to GRET – Gray Enhanced Anti-aliasing Technology, and the input bitmap is a binary bitmap, col 12, lines 23-62**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Curry' 636 reference to include wherein the determining comprises selecting the bitmap is selected from a set of bi-level bitmaps taught by Tai to produce smoother image without jagged edge.

Regarding claim 5, in accordance with claim 1.

Curry' 636 discloses wherein the producing comprises producing the output halftone image blocks with a dimension that is different from a corresponding dimension of the respective ones of the contone (**refer to Figs. 4 & 5, Fig. 5 shows an enlarge portion of Fig. 4, in which, it is obvious that the output halftone block is different from corresponding block of the contone image, e.g. a human readable pattern is**

encoded in the circle block 34, col 5, lines 20-27 while the input image do not have the embedded pattern).

Regarding claim 6, in accordance with claim 1.

Curry' 636 does not teach wherein the sequence of graphical code word symbols corresponds to a graphical bar code.

Wang' 361 teaches wherein the sequence of graphical code word symbols corresponds to a graphical bar code (**Figs 1 & 2, col 3, lines 58-65).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Curry' 636 and Tai' 420 to include wherein the sequence of graphical code word symbols corresponds to a graphical bar code taught by Wang' 361 because graphical bar code is error-correctable to allow recovering the information which may be distorted (col 3, line 60-64).

Regarding claim 7, in accordance with claim 1.

Claim 7 recites identical features of halftoning the contone image blocks and determining whether to derive whether to derive ones of the output halftone image blocks from either respective ones of the contone image blocks or respective ones of the graphical code word symbols based on image intensity levels in the respective ones of the contone image blocks as claim 1. Thus, arguments similar to that presented above for claim 1 are also equally applicable to claim 7.

Regarding claim 10, in accordance with claim 1.

Curry' 636 disclose an apparatus for performing the method of claim 1 (**the image generating system of Fig. 1, col 2, lines 33-40**).

Regarding claim 11, in accordance with claim 1.

Curry' 636 discloses an article comprising memory encoded with a program for causing a processor to perform the method of claim 1 (e.g. using a computer to generate image must have a software program to support performing the method of claim 1, col 3, line 31 through col 4, line 5).

Regarding claim 29.

Claim 29 is directed to a computer-readable medium claim which substantially corresponds to operation of the device in claim 1, with processing steps directly corresponding to the function of device elements in claim 1. Thus, claim 29 is rejected as set forth above for claim 1.

Regarding claim 30, in accordance with claim 29.

Claim 30 recites identical features as claim 2, except claim 30 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 2 are also equally applicable to claim 30.

Regarding claim 31, in accordance with claim 30.

Claim 31 recites identical features as claim 3, except claim 31 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 3 are also equally applicable to claim 31.

Regarding claim 32, in accordance with claim 29.

Claim 32 recites identical features as claim 5, except claim 32 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 5 are also equally applicable to claim 32.

Regarding claim 33, in accordance with claim 29.

Claim 33 recites identical features as claim 6, except claim 33 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 6 are also equally applicable to claim 33.

Regarding claim 34, in accordance with claim 29.

Claim 34 recites identical features as claim 7, except claim 34 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 7 are also equally applicable to claim 34.

7. **Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US 5,710,636) in view of Tai et al (Tai) (US 7,218,420) and further in view of Wang et al (Wang) (US 5,337,361) as applied to claim 1 above, and further in view of Lapstun (US 6,512,596).**

Regarding claim 8, in accordance with claim 1.

Curry does not teach error diffusion.

Lapstun' 596 discloses a halftoner/compositor, in that he teaches that the halftoning is error diffusion halftoning (col 18, lines 53-57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Curry' 636, Tai' 420 and Wang' 361 to include the halftoning is error diffusion halftoning taught by Lapstun' 596 because it gives better result (col 18, lines 55-57).

Regarding claim 9, in accordance with claim 1.

Curry' 636 does not teach that further comprising diffusing error values determined from the output halftone image blocks.

Lapstun' 596 teaches further comprising diffusing error values determined from the output halftone image blocks (**e.g. a dither volume provides great flexibility in dither cell, col 37, lines 6-20**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Curry' 636, Tai' 420 and Wang' 361 to include further comprising diffusing error values determined from the output halftone image blocks taught by Lapstun because it gives better result (col 18, lines 55-57).

8. **Claims 12-20 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US 6,252,971) in view of Curry (US 5,710,636) and further in view of Wang et al (Wang) (US 5,337,361)**

Regarding claim 12.

Wang '971 discloses a method of extracting information embedded in a halftone image (**Fig. 1 is a halftone image containing an embedded invisible watermark, and Fig. 11 is functional block diagram for watermark retrieval, col 7, lines 1-24**), the method comprising: accessing a bi-level bit map ("**Invisible watermark retrieval depends generally on the pixel-to-pixel comparison between a bitmap of a halftone image and the bitmap of a halftone image having a certain shift relative to itself**", **where halftone is a binary image and one skilled in the art at the time the**

invention was made, understands that a bitmap associated with a halftone image must be a binary bitmap, in which the bit value can be either "1" or "0"; thus, "Invisible watermark retrieval" must access a bi-level bit map for watermark extraction, col 1, line 61 through col 2, line 4); partitioning the halftone image into a plurality of image blocks (**refer to Fig. 6, halftone image is partitioned into a series of tiles, or blocks, e.g. "these tiles establish the basic building blocks from which zero phase-shifted clustered halftones can be converted to π phase-shifted cluster halftones" also indicating that halftone image is partitioned into tiles or blocks; col 4, lines 1-28)**; identifying (**e.g. detecting)** a code word sequence (**e.g. the watermark of "T" in the image blocks**) in the selected blocks (**e.g. by arranging tiles in a particular order as disclosed in Fig. 7, col 4, lines 29-44**); and extracting the information from the code word sequence (refer to **Fig. 11, a watermark extracting device 700' for extracting embedded digital watermark, col 7, lines 1-24)**.

Wang '971 does not explicitly teach using the bitmap to select at least some of the blocks.

Curry' 636 teaches using the bitmap to select at least some of the blocks ("**The bitmap codes are based upon at least one human readable pattern to be formed within the image", and "the human readable pattern 29 shown in Fig. 3 is a letter 'R'"; one skilled in the art at the time the invention was made knows to use bitmap to select some of cells, or blocks, e.g. cells 20, 22 and 24, because bitmap codes are generated from those cells, or blocks, col 2, lines 35-40 & col 4, lines 45-56**).

Having a method of extracting information embedded in a halftone image of Wang ‘971 reference and then given the well-established teaching of Curry’ 636 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of extracting information embedded in a halftone image of Wang ‘971 reference to include using the bitmap to select at least some of the blocks as taught by Curry’ 636 reference since doing so would increase the versatility of retrieve halftone cells or blocks for embedded pattern extraction in the method of extracting information embedded in a halftone image and further the technique provided could easily be established for one another with predictable results.

Regarding claim 13, in accordance with claim 12.

Wang ‘971 discloses wherein the using comprises selecting ones of the image blocks at a rate that is linked to a graylevel of the halftone image (**refer to Fig1, a halftone image containing an embedded digital watermark and Fig. 2, embedded watermark retrieval; it is known in the art that bit value of a bitmap is determined by a graylevel of the halftone image, e.g. “1”s or “0”s, depends on the presence or absence of the marks in the image blocks, or cells or sample values; giving the fact that “the pixel-to-pixel comparison between the original and the shift bitmaps”, it is obvious that “selecting ones of the image blocks at a rate is linked to a graylevel of the halftone image", col 1, line 61 to col 2, line 4).**

Regarding claim 14, in accordance with claim 12.

Wang ‘971 does not explicitly teach wherein the accessing comprises selecting the bitmap from a table of different bi-level bitmaps.

Curry teaches wherein the accessing comprises selecting the bitmap from a table of different bi-level bitmaps (e.g. a look-up table, **col 3, lines 62 through col 4, line 5**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Wang ‘971 to include the accessing comprises selecting the bitmap from a table of different bi-level bitmaps taught by Curry’ 636 to save processing time.

Regarding claim 15, in accordance with claim 1.

Wang ‘971 does not explicitly teach wherein the accessing comprises using a gray level value as an index into the table of the different bi-level bitmaps.

Curry teaches wherein the accessing comprises using a gray level value as an index into the table of the different bi-level bitmaps (**e.g. the look-up table in the memory is addressed by the grayscale image sample values and the grayscale values , e.g. for a 8-bits system it has 0-255 gray values to represent pixel values in an image; thus it is obvious to use a gray level value as an index into the table of the different bi-level bitmaps; col 3, line 62 through col 4, line 5).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Wang ‘971 to include wherein the accessing comprises using a gray level value as an index into the table of the different bi-level bitmaps taught by Curry’ 636 to save processing time.

Regarding claim 16, in accordance with 12.

Wang '971 discloses , wherein the using comprises determining which of the image blocks to select based on image intensity levels of the image blocks (**it is well known in the art that "yellow" color has most intensity level of a image block, or cell, or sample values; giving the fact that "the yellow channel might be the best choice to hide digital watermarks since the phase transition will be less noticeable when embedded in the yellow color separation layer", one ordinary skill in the art would determine image block or cell base on intensity levels of the image block or cell or sample values; col 4, lines 53-65**).

Regarding claim 17, in accordance with claim 12.

Wang '971 discloses using unselected ones of the image blocks to construct a version of the halftone image free of the embedded information (**refer to Fig. 7, image tiles or blocks are selected to be arranged in a particular orientation for watermark embedding; this implies that for those unselected image tiles or blocks, they are free of embedded information. col 4, lines 29-44**).

Regarding claim 18, in accordance with claim 12.

Wang '971 discloses wherein the extracting comprises using probabilistic analysis to produce a set of probability parameters, using the set of probability parameters to select a likely sequence of graphical code word symbols encoded into the halftone image, and converting the most likely selected sequence of graphical code word symbols ~~image blocks~~ into the extracted information (**Wang '971 discloses watermark detection circuit, checkerboard pattern, bitmaps, and pixel-to-pixel, cluster-to-cluster, etc. one skilled in the art knows to use a set of probability to**

analyze or to detect embedded pattern; col 1, line 61 through col 2, line 19 & col 7, lines 13-24).

Regarding claim 19, in accordance with claim 12.

Wang '971 discloses an apparatus for performing the method of claim 12 (**refer to Fig. 11, a functional block diagram of a watermark retrieval device for performing the method of claim 12, col 7, lines 1-13**).

Regarding claim 20, in accordance with claim 12.

Wang '971 discloses an article comprising memory encoded with a data for causing a processor to perform the method of claim 12 (**giving the fact that watermark embedding device of 700 of Fig. 8 and watermark retrieval device 700' of Fig. 11, are preferably implemented on a computer, the processes of Figs. 10 and 13 thus are processed by the devices of 700 and 700', respectively; process or an algorithm of Fig. 10 and Fig. 13 are articles or computer software and computer contains memory; col 8, lines 13-29**).

Regarding claim 35.

Claim 35 is directed to a computer-readable medium claim which substantially corresponds to operation of the device in claim 12, with processing steps directly corresponding to the function of device elements in claim 12. Thus, claim 35 is rejected as set forth above for claim 12.

Regarding claim 36, in accordance with claim 35.

Claim 36 recites identical features as claim 14, except claim 36 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 14 are also equally applicable to claim 36.

Regarding claim 37, in accordance with claim 35.

Claim 37 recites identical features as claim 16, except claim 37 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 16 are also equally applicable to claim 37.

Regarding claim 38, in accordance with claim 35.

Claim 38 recites identical features as claim 18, except claim 38 is a computer-readable medium claim. Thus, arguments similar to that presented above for claim 18 are also equally applicable to claim 38.

(10) Response to Argument

Applicant's arguments filed on 10/02/2008 have been fully considered but they are not persuasive.

Appellant, on pages 6-10, argues, "Claim rejections under 35 U.S.C. 112, first paragraph"

With respect to claims 1-11, appellant argues, "**Thus, specification explicitly discloses that if the halftone bitmap bit has a value of 1 (i.e., b(m)=1), :the bit is a data indicator bit and the corresponding block of the halftone image 390 is set to one of the code word symbols (see ¶ 31, ¶42, and FIG. 3); if the halftone bitmap bit has a value of 0 (i.e., b(m)=0), the bit is an image indicator bit and the corresponding block of the halftone image 390 is set to the value of the quantized halftone image blocks o(m) (see ¶ 30, ¶ 42, and FIG. 3). The specification also**

explicitly discloses that if certain minimum or maximum intensity thresholds are met, then the corresponding block of the halftone image 390 is set to the value of the quantized halftone image blocks o(m) (see 'I[33 and ¶ 42, last sentence).

One skilled in the art at the lime the application was filed would have understood from these explicit teachings that blocks of the output halftone image 390 are produced from ones of the contone image blocks x(m) and ones of the graphical code word symbols 360 in accordance with the values of respective ones of the bits of the bi-level bitmap 3 I0, wherein ones of the output halftone image blocks associated with respective ones of the bits 310 having a value of 0 (or that correspond to image blocks meeting certain intensity thresholds) are derived from respective ones of the contone image blocks ,and ones of the output halftone image blocks associated with respective ones of the bits 310 having a value of 1 are derived from respective ones of the graphical code word symbols 360."

In re, the examiner respectfully disagrees with the above statements. The arguments above do not support the claim limitation of "ones of the bits having the first value are derived from respective ones of the contone image blocks". One ordinary skill in the art knows that a halftone image is a binary image and its bit value can be either 1 or 0, e.g. **(i.e., b(m)=1 or b(m)=0)**. However, the original disclosure does not support "wherein ones of the output halftone image blocks associated with respective ones of the bits having the first value **are derived from respective ones of the contone image blocks** and ones of the bits having the second value **are derived from respective ones of the graphical code word symbols**".

With respect to claims 1 and 21, limitation recites, " wherein ones of the output halftone image blocks associated with respective ones of the bits having the first value

are derived from respective ones of the contone image blocks and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols" (emphasis added by applicant), in which the underlined limitations are not disclosed in the original specification. Claim 21 cites identical limitation as claim 1. Thus both claims 1 and 21 are rejected under 35 U.S.C. 112, first paragraph. The closest descriptions found in the original specification are paragraphs 31, 33 and 42.

> Par. 31, recites, "Code words are generated by a code word sequence generator 360 from embedded data 210. In one embodiment, this merely involves using embedded data 210 directly, bit by bit. In another embodiment, error checking coding is added to embedded data 210 first, before being converted to code words. In yet another embodiment, data 210 is compressed before being translated into code words by a code word sequence generator 360. The code word sequence generator 360 utilizes the incoming data to produce graphical symbols which correspond to the code words. At logic stage 350, when a bit from halftone bitmap 310 corresponding to the spatial location of halftone image data o(m) is b(m)=l, then a symbol corresponding to a code word is generated and the output is set to that symbol. More than one symbol may be used to represent a single code word as long as the code word is uniquely encodable from the symbol alone. The output from logic stage 350 is assembled into encoded halftone image 390, which corresponds to output 230."

Par. 31 (also, refer to Fig. 2A for embedded data 210 and output 230, and refer to Fig. 3 for code word sequence generator 360, logic stage 350 and halftone bitmap 310) is about generating code words. There is no functional structure elements, steps, or processes supporting the features of "respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks" and "and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols" (emphasis are added by the examiner)as claimed in the invention of claims 1 and 21 in the original disclosure. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

> Par. 33, recites, "In one embodiment, logic stage 350 may also contain additional logic that causes the test of b(m) to be skipped when the input block x(m) meets certain requirements, such

> as meeting certain minimum or maximum intensity thresholds, whereby the modified input image block is passed through to the output of logic stage 350. This may be done to improve the visual quality of the resultant encoded halftone image, as well as to reduce the accumulation of quantization errors in the resultant halftone image which occur when the code word block symbols are significantly different from the modified input image blocks in terms of average intensity value."

Par. 33 is about skip of testing b(m) by the logic stage 350 when the input block x(m) meets certain requirements such meeting certain minimum or maximum intensity thresholds. The structure elements disclosed in Figs. 2A and 3 are for an encoding process of encoding, or embedding a code word into an input image. Again, there is no functional structure elements, steps, or processes supporting the features of "<u>respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks</u>" and "<u>and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols</u>" (emphasis are added by the examiner) as claimed in the invention in claims 1 and 21 in the original disclosure. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

> Par. 43, recites, "In code word extraction stage 430, each relative bit of binary bitmap 450 is tested to see if it is a data indicator bit (e.g. value of 1) or an image indicator bit (e.g. value of 0). If it is an image indicator bit, the related sub-matrix of the aligned and corrected input image 250 is ignored or used to reconstruct the image (431); if it is a data indicator bit, then the image sub-matrix is passed to probabilistic analysis stage 440. In one embodiment, code word extraction stage 430 may also contain additional logic that causes the test of b(m) from bitmap 450 to be skipped when the input block meets certain requirements, such as meeting certain minimum or maximum intensity thresholds, whereby the modified input image block is simply ignored as it is known to not be a data block."

Par. 43 (also, refer to Fig. 2B for input image 250, and refer to Fig. 4 for binary bitmap 450, extraction stage 430) is about code word extraction. The structure disclosed in Figs. 2B and 4 is for extracting a code word from the input image 250. Again, there is no functional structure elements, steps, or processes supporting the features of "<u>respective</u>

ones of the bits having the first value **are derived** from respective ones of the contone image blocks" and "and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols" (emphasis are added by the examiner) as claimed in the invention of claims 1 and 21 in the original disclosure. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

Claims 22-28 are dependent claims to claim 21, and are rejected under 35 U.S.C. 112, first paragraph for the same reason in the rejection of claim 21 in this section.

In addition, Applicant amended claims 1-9 and 21-28 with new features and failed to comply with 37 CFR 1.173 for not to disclose any support of claim changes. 37 U.S.C. 1.173(c) requires that "Whenever there is an amendment to the claim pursuant to paragraph (b) of this section, there must also be supplied, on pages separate from the pages containing the changes, the status (i.e. pending or canceled), as of the date of the amendment, of all patent claims and of all added claims, and an explanation of the support in the disclosure of the patent for the changes made to the claims". Applicant failed to provide "an explanation of the support in the disclosure of the patent for the changes made to the claims".

Appellant, on pages 8-9, argues, "Regarding claim 3, the Examiner has stated that (see § 4 on page 3 of the final office action):

> Regarding claim 3, recites, "wherein the determining comprises producing the bitmap by halftoning a contone patch of the graylevel ~~is determined by the coding rate~~ value" (emphasis added by applicant), in which "contone patch" is not disclosed in the original specification.

Contrary to the Examiner's statement, however, "contone patch" is disclosed in ~1 13.

The term "contone patch" also is disclosed in each of claims 2, 22, and 30, as originally filed.

In addition, ¶l 1.3 explicitly explains that in some embodiments the bit map is produced by half toning a constant patch of a graylevel.

Thus, the subject, matter of claim 3 is described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor had possession of the

claimed invention at the time the application was filed. For at least these reasons, the rejection of independent claim 3 under 35 U.S.C. § 112, first paragraph, should be withdrawn

for at least this reason."

In re, the examiner does not agree with the above argument. Regarding claim 3, recites, "wherein the determining comprises producing the bitmap by halftoning a contone patch of the graylevel value" (emphasis added by applicant), which is not disclosed in the original specification. The only description found in the original specification is Par. 13.

> Par. 13, recites, "As shown in the drawings for purposes of illustration, the present invention is embodied in a method of processing a continuous tone image. The method includes using a halftone screen to generate a bi-level bitmap; partitioning the contone image into an array of image blocks; halftoning the image blocks; using the bi-level bitmap to select some of the halftone image blocks; and modifying the selected halftone image blocks using code words, such that information contained in the code words is embedded in a halftone image. The information may be embedded at a rate that is linked to a graylevel of a contone patch. **The bitmap may be produced by halftoning the constant patch of the graylevel**. The graylevel is determined by a coding rate." (emphasis is added by the examiner)

However, merely cites "The bitmap may be produced by halftoning the constant patch of the graylevel" without functional structure elements, steps or processes disclosed in the disclosure to support the feature of "wherein the determining comprises producing the bitmap by halftoning a contone patch of the graylevel value" is not considered an adequate written description of the claimed invention as claimed in the invention of claim 3. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004).

Appellant, on pages 9-10, argues, "Contrary to the Examiner's assertion, the original specification clearly discloses first and second sequences of graphical Code words. In particular, the original specification discloses that a first sequence of graphical code words (corresponds to the sequence of code words generated by the selection logic 350 from the code word source 360 in accordance with the bits of the bit map 310) is embedded into the halftone image 390 (see, e.g., ¶ 31).

The original specification also discloses that a second sequence of graphical code words (corresponding to the output of the probabilistic analysis and the code word decoding stages 440, 480) is identified from the ones of the aligned and geometrically

corrected sub-matrices of the input image 250 that as associated with bits of the bit map 450 that have a value of 1 (see ¶¶ 42, 43).

Thus, the subject matter of claim 21 is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor had possession of the claimed invention at the time the application was filed. For at least these reasons, the rejection of independent claim 21 under 35 U.S.C. § 112, first paragraph, should be withdrawn."

In re, the examiner does not agree with the above argument because it is not persuasive. With respect to claim 21, recites, "**Apparatus comprising one of an encoder for encoding a contone image and a decoder for decoding a halftone image; the encoder being operable to perform operations comprising determining a first bi-level bitmap of bits from a graylevel value, wherein each of the bits has a respective one of either a first value or a second value, partitioning the contone image into an array of contone image blocks, generating a first sequence of graphical code word symbols encoding information, and producing blocks of an output halftone image from ones of the contone image blocks and ones of the graphical code word symbols in accordance with the values of respective ones of the bits of the bi-level bitmap, wherein <u>ones of the output halftone image blocks associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks and ones of the output halftone image blocks associated with respective ones of the bits having the second value are derived from respective ones of the graphical code word symbols</u>; and the decoder being operable to perform operations comprising determining a second bi-level bit map of bits from a graylevel value, wherein each of the bits of the second bi-level bit map has a respective one of two different values, partitioning a version of the output halftone image into a plurality of partitioned halftone image blocks, selecting ones of the partitioned halftone image blocks in**

accordance with the values of respective ones of the bits of the second bitmap <u>identifying a second sequence of graphical code word symbols from the selected ones of the partitioned halftone image second blocks, and extracting information from the second sequence of graphical code word symbols</u>" (emphasis added by the examiner).

The closest descriptions found in the original specification are Paragraphs 31, 42 and 43.

> Par. 31, recites, "Code words are generated by a code word sequence generator 360 from embedded data 210. In one embodiment, this merely involves using embedded data 210 directly, bit by bit. In another embodiment, error checking coding is added to embedded data 210 first, before being converted to code words. In yet another embodiment, data 210 is compressed before being translated into code words by a code word sequence generator 360. The code word sequence generator 360 utilizes the incoming data to produce graphical symbols which correspond to the code words. At logic stage 350, when a bit from halftone bitmap 310 corresponding to the spatial location of halftone image data o(m) is b(m)=l, then a symbol corresponding to a code word is generated and the output is set to that symbol. More than one symbol may be used to represent a single code word as long as the code word is uniquely encodable from the symbol alone. The output from logic stage 350 is assembled into encoded halftone image 390, which corresponds to output 230."

> Par. 42, recites, "As with the encoding process, logic stage 350 uses the binary bitmap 450 to determine where in an image embedded information is stored. The input image is partitioned into sub-matrices. The sub-matrix block size may either be a constant based on the application, or determined dynamically via methods similar to those described for determination of the value of halftone gray level 460."

> Par. 43, recites, "In code word extraction stage 430, each relative bit of binary bitmap 450 is tested to see if it is a data indicator bit (e.g. value of 1) or an image indicator bit (e.g. value of 0). If it is an image indicator bit, the related sub-matrix of the aligned and corrected input image 250 is ignored or used to reconstruct the image (431); if it is a data indicator bit, then the image sub-matrix is passed to probabilistic analysis stage 440. In one embodiment, code word extraction stage 430 may also contain additional logic that causes the test of b(m) from bitmap 450 to be skipped when the input block meets certain requirements, such as meeting certain minimum or maximum intensity thresholds, whereby the modified input image block is simply ignored as it is known to not be a data block."

As discussed above, there is no functional structure elements, steps, or processes supporting the features of "<u>respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks</u>" and "<u>and ones of the bits having the</u>

<u>second value **are derived** from respective ones of the graphical code word symbols”</u> (emphasis are added by the examiner) as claimed in the invention of claim 21 in the original disclosure. See, e.g. Univ. of Rochester v. G.D. Searle & Co., 358 F.3d 916, 927, 69 USPQ2d 1886, 1894-95 (Fed. Cir. 2004). At least for this rational, claim 21 rejection under 35 U.S.C. §112, first paragraph is maintained.

Appellant, on pages 10-13, argues, “Claim rejection under 35 U.S.C. §112, second paragraph”.

With respect to claims 1-11, Appellant argues, “Nevertheless, the mere assertion that "Applicant. failed to particularly point out how and in what extent the derivation of values from 'contone image block' and 'graphical code word' does not constitute an explanation why one of ordinary skill in the pertinent art, when reading the claims in light of the supporting specification and the prior art, would not have been able to ascertain with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims I-! I. Thus, the Examiner has not established a prima facie case of indefiniteness and therefore the rejection of claims l-l I under 35 U.S.C. § 112, second paragraph, should be withdrawn for at least this reason.

In addition, one of ordinary skill in the pertinent art, when reading claims 1-11 in light. of the supporting specification would have been able to ascertain with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims. Indeed, the Examiner himself appears to have understood the scope of claims l-! !; the Examiner's rejection of these claims under 35 U.S.C. § 112,

second paragraph, appears to be based only his apparent inability to find the support for certain language of claim 1 in the original disclosure. As explained above in connection with the rejection of claim l under 35 U.S.C. § 112, first paragraph, however, the original disclosure does in fact disclose the subject matter of claim l in such a way as to reasonably convey to one skilled in the relevant art that the inventor had possession of the claimed invention at the time the application was filed. This explanation also includes a showing of the original specification discloses a contone image processing method that involves producing blocks of an output halftone image n which "ones of the output halftone image blocks associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks and ones of the output halftone image blocks associated with respective ones of the bits having the second value are derived from respective ones of the graphical code word symbols," as recited in claim 1."

In re, the examiner disagrees with the above arguments. Without the description support in the disclosure, one ordinary skill in the art does not know what how and what extent that the features of "<u>respective ones of the bits having the first value **are derived** from respective ones of the contone image blocks</u>" and "<u>and ones of the bits having the second value **are derived** from respective ones of the graphical code word symbols</u>" are carried through. As discussed in the claims rejection under 35 U.S.C. §112, first paragraph, the examiner has established a prima facie case that appellant fails to provide adequate description for the above mentioned elements and thus fails to

particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect claims 18, 28 and 38, appellant, on page 13, argues, “Contrary to the Examiner's assertion, claims 18, 28, and 38 are definite. The adjective "likely" means "'having a high probability of occurring or being true : very probably" (see Merriam-Webster's Collegiate Dictionary - Tenth Edition (1995)). One of ordinary skill in the pertinent art, when reading claims 18, 28, and 38 in light of the supporting specification (see, e.g., ¶ 43) would have been able to ascertain with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims. In particular, such a person would have been able to ascertain that a likely sequence of graphical code word symbols is a graphical code word symbol sequence that has a high probability of being the actual code word sequence that was encoded into the halftone image.”

In re, the examiner disagrees with the above arguments. Claim language is to identify the boundaries of the protection sought by the applicant and using words like “likely” in the claim is considered indefinite. In addition, although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns,* 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Thus, the rejection of claims 18, 28 and 38 under 35 U.S.C. §112, second paragraph is maintained.

Appellant, on pages 16-18, argues, "**The cited references do not discloses or suggest the "producing" element of claim1**".

With respect to claim 1, recites, "**A method of processing a contone image, the method comprising: determining a bi-level bitmap of bits from a graylevel value, wherein each of the bits has a respective one of either a first value or a second value; partitioning the contone image into an array of contone image blocks; generating a sequence of graphical code word symbols encoding information; and producing blocks of an output halftone image from ones of the contone image blocks and ones of the graphical code word symbols in accordance with the values of respective ones of the bits of the bi-level bitmap, wherein ones of the output halftone image blocks associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks and ones of the output halftone image blocks associated with respective ones of the bits having the second value are derived from respective ones of the graphical code word symbols**".

With respect to the argument, "**The cited references do not disclose or suggest the 'producing' element of claim 1**", pages 16-18, Appeal Brief. appellant argues, "It is noted that the Examiner has misquoted the first clause of the 'producing' element of claim I in the rationale given in support of the rejection of claim 1. In particular, the Examiner has stated that Curry discloses producing blocks of an output halftone image 'from ones of the contone image blocks and ones of the bit map.' The pertinent clause of claim I, however, recites: 'producing blocks of an output halftone image from ones of the contone image blocks and ones of the graphical code word symbols in accordance with the values of respective ones of the bits of the bi-level bitmap.' Thus, on its face, the Examiner has not shown that Curry discloses the subject matter defined in the first clause of the 'producing' element of claim 1."

In response: The examiner disagrees the above argument and that Curry' 636 fails to disclose "the 'producing' element of claim 1". As discussed in the claim 1 rejection under 35 U.S.C. 103 (a) above, Curry' 636 discloses the limitation of "**producing blocks of an output halftone image from ones of the contone image blocks and ones of the graphical code word symbols in accordance with the values of respective ones of the bits of the bi-level bitmap**."

The examiner takes the position that Curry' 636 discloses both the first clause and the second clause of the "producing" element of claim 1 in Figs. 1 and 3, and col 1, lines 46-50, col 3, lines 36-45, line 62 to col 4, line 5, and col 4, lines 57-63:

- In Fig. 1, Curry discloses an image generation system 8 that produces a halftone image (as of Figs. 3 and 4) based on halftone cells, which are generated by halftone generator 14 from a set of grayscale image (generated by image generator 12) and bitmap codes (generated by bitmap generator 10).

- In Fig. 3, Curry discloses an halftone image produced by the image generation system 8 of Fig. 1. The halftone image in Fig. 3 has a human readable pattern "R" and is formed from the three different type of halftone cells (or blocks).

- In col 1, lines 46-50, Curry' 636 discloses "machine readable digital data can be recorded by writing two dimensional marks on a recording medium in accordance with a pattern which encodes the data either by the presence or absence of marks at a sequence of spatial locations or by the presence or absence of mark related transitions at such locations".

- In col 3, lines 36-45, Curry' 636 discloses "The halftone generator 10 generates halftone cells based on grayscale image data and bitmap codes. The grayscale image data is generated by image generator 12. Image generator 12 may be a device capable of outputting image data, such as a scanner or a computer. The bitmap codes are generated by a bitmap generator 10 based upon a desired pattern to be embedded within the halftone image. The desired pattern may be input to bitmap generator

10 on, for example, a keyboard (not shown) connected to the bitmap generator 10”.

- In col 3, line 62 to col 4, line 5, Curry’ 636 disclose that contone image is scanned in or computer generated synthetic grayscale images; the halftone generator 14 transforms grayscale input image sample values (or cells or blocks) into halftone dot patterns, which are written into two-dimensional array of halftone cells (or blocks) and the halftone generator may have a look-up table in a memory that is addressed by the grayscale image sample values (or cells or blocks) and the bitmap codes to retrieve halftone cells (or blocks) that are preprogrammed to certain appropriate dot pattern.

- In col 4, lines 57-63, Curry’ 636 discloses “Each of the halftone cells 20, 22 and 24 shown in FIG. 3 is illustrated with a "1" or "0" shown in the lower right hand corner of the halftone cells 20, 22 and 24. The "1" or "0" are shown for illustration purposes only in FIG. 3 and represent a data value that may be encoded in each of the halftone cells 20”.

Thus, Curry’ 636 teaches both the first and the second clauses of the “producing” limitation in claim 1 (as argued by the applicant): Curry discloses **producing blocks (e.g. halftone cells 20, 22 & 24 of Fig. 3) of an output halftone image (Fig. 3) from ones of the contone image blocks (grayscale sample values, or cells or blocks, col 3, line 37 to col 4, line 5)**, and the second clause of the “producing” in claim 1: Curry discloses **ones of the graphical code word symbols (e.g. the letter “R” of Fig. 3) in accordance with the values of respective ones of the bits of the bi-level bitmap (e.g. bitmap codes are generated based on a desired pattern or “the graphical code word symbols” to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45, and**

to encode the data either by the presence or "1" ,or absence or "0" of marks at a sequence of spatial locations, col 1, lines 46-50 discussed above).

With respect to the argument, "**The cited references do not discloses or suggest the 'determining' element of Claim1**", page 18-19, Appeal Brief.

In re, the examiner disagrees with the above argument and takes the position that Curry' 636 discloses the "determining" element of claim 1 in Fig. 1, and col 1, lines 46-50, col 3, lines 36-45, line 62 to col 4, line 5, and col 4, lines 57-63 as stated above.

For instance, Curry' 636 discloses determining a bi-level bitmap of bits from a graylevel value (**e.g. Curry discloses that halftone image, such as the one disclosed in Figs. 3 and 4, is generated based on grayscale image data and bitmap codes, by the halftone generator as disclosed in Fig. 1, col 3, lines 37-61; and grayscale image data e.g., a 8-bits at 0-255 different intensity and a halftone image is a binary image are well known in the art; bitmap codes are generated based on a desired pattern to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45; the purpose of having bitmap code generated from pattern in the processing of encoding is to encode the data either by the presence or absence of marks at a sequence of spatial locations, col 1, lines 46-50; thus, bitmap code is a bi-level bitmap of bits and is determined from a graylevel value for either is "presence" or "absence" of marks in order to match the grayscale input images**).

With respect to the argument, “**There is no apparent reason to combine the teachings of the cited reference in the manner proposed by the Examiner**”, page 19-21, Appeal Brief.

Appellant argues, “First, the Examiner has not given any explanation of the apparent reason one skilled in the art would have been led to modify Curry ‘to include determining a bi-level bitmap of bits from a graylevel value, wherein each of the bits has a respective one of either a first value or a second value.’” “Second, the disclosure in col. 13, lines 29-34 of Tai does not support the Examiner's assertion that partitioning the grayscale image data disclosed in Curry into an array of contone image blocks produces smoother image without jagged edges”, and “Third, Wang does not support the Examiner's assertion that modifying Curry's system to include generating a sequence of graphical code word symbols encoding information would validate or authenticate the finished image”.

In re, the examiner disagrees with the assertion made above by the appellant. Giving the fact that the method of processing a contone image of claim 1 can be processed in the image generation system of Curry' 636, and the fact that the teaching of partitioning (**e.g. creating**) the contone image into an array of contone image blocks in more detail by Tail’ 420, one ordinary skill in the art at the time the invention was made could be motivated to modify the image generation system of Curry’ 636 to include the technique of partitioning the grayscale image data disclosed in Curry to

improve the image quality by eliminating jagged edges. Further, In the same field of endeavor, Wang' 361 discloses generating **(e.g. composing)** a sequence of graphical code word symbols <u>encoding information</u> (**Wang' 361 discloses "a sequence of graphical code word symbols encoding information" such codeword structure of PDF417, Figs. 1 & 2, col, 5, line 56 to col 7, line 60, and encoding/decoding process in col 7, line 63 to col 8, line 58, and so on**); and

Giving the fact that the method of processing a contone image of claim 1 can be processed in the image generation system of Curry' 636, and the fact that the teaching of partitioning (**e.g. creating**) the contone image into an array of contone image blocks in more detail by Tail' 420, one ordinary skill in the art at the time the invention was made could be motivated to modify the combination of Curry' 636 and Tai' 420 to include generating a sequence of graphical code word symbols <u>encoding information</u> since_doing so would not only to increase the versatility of Curry's method, but also to improve the finished image validation or authentication.

Thus, the examiner has established *a prima facie* case that claim 1 is obvious over the cited references.

With respect to the argument, "**Claims 2-7,10 and 11**", pages 21-22, Appeal Brief.

Appellant argues, "The rationale given by the Examiner in support of the rejection of claim 1, however, does not include any showing whatsoever that any of the cited references discloses or suggests and of: (i) 'halftoning the contone image blocks'; and

(ii) 'determining whether to derive ones of the output halftone image blocks from either respective ones of the contone image blocks or respective ones of the graphical code word symbols based on image intensity levels in the respective ones of the contone image blocks.' Thus, the Examiner has failed to establish *a prima facie* case that claim 7 is obvious over the cited references. For at least this additional reason, the rejection of claim 7 under 35 U.S.C. § 103(a) over Curry in view of Tai and Wang should be withdrawn."

In re, the examiner disagrees the above statements. With respect to claim 7, a dependent claim of claim 1, recites, "wherein the producing comprises halftoning the contone image blocks, and determining whether to derive ones of the output halftone image blocks from either respective ones of the contone image blocks or respective ones of the graphical code word symbols based on image intensity levels in the respective ones of the contone image blocks". In fact, limitations of claim 7 recites the similar features of claim1, thus claim 7 is rejected for the same reason discussed in the rejection of claim 1 under 35 USC 103 (a). For example, Curry' 636 discloses (i) halftoning the contone image blocks' (producing blocks of an output halftone image (**e.g. halftone cells 20, 22 & 24 of Fig. 3**) from ones of the contone image blocks (**e.g. blocks or cells or sample values of grayscale input images discussed above**) – see the discuss of claim 1 rejection above); and (ii) determining whether to derive ones of the output halftone image blocks from either respective ones of the contone image blocks or respective ones of the graphical code word symbols based on image intensity

levels in the respective ones of the contone image blocks (determining a bi-level bitmap of bits from a graylevel value (**e.g. Curry discloses that halftone cell, such as halftone cells 20,22 and 24, is generated based on grayscale image data and bitmap codes, Fig. 1 and col 3, lines 37-61; grayscale image data, e.g. a 8-bits at 0-255 different intensity and a halftone image is a binary image are well known in the art; bitmap codes are generated based on a desired pattern to be embedded within the halftone image, and the desired pattern is input into bitmap generator 10 of Fig. 1, col 3, lines 36-45; the purpose of having bitmap code generated from pattern in the processing of encoding is to encode the data either by the presence or absence of marks at a sequence of spatial locations, col 1, lines 46-50; thus, bitmap code is a bi-level bitmap of bits and is determined from a graylevel value for either is "presence" or "absence" of marks in order to match the grayscale input images**), and wherein ones of the output halftone image blocks (**e.g. halftone cells 20, 22 & 24 of Fig. 3**) associated with respective ones of the bits having the first value are derived from respective ones of the contone image blocks (**e.g. the bit values, "1"s or "0"s are derived based on the presence or absence of marks of the contone image blocks, or cells, or sample values discussed above, col 1, lines 46-50**) and ones of the output halftone image blocks associated with respective ones of the bits having the second value are derived (**e.g. generated**) from respective ones of the graphical code word symbols (**e.g. bitmap codes are generated based on a desired pattern or "the graphical code word symbols" to be embedded within the halftone image, and the desired pattern is input into bitmap**

generator 10 of Fig. 1, col 3, lines 36-45, and to encode the data either by the presence or "1" ,or absence or "0" of marks at a sequence of spatial locations, col 1, lines 46-50 discussed above) - see the discuss of claim 1 rejection above).

Thus, the examiner has established *a prima facie* case that claim 7 is obvious over the cited references.

With respect to arguments, "**Claims 29-34**", page 22, Appeal Brief.

Appellant argues, "Independent claim 29 recites elements that essentially track the pertinent elements of independent claim 1 discussed above. Therefore, claim 29 is patentable over Curry in view
of Tai and Wang for at least the same reasons explained above in connection with independent claim 1.
Each of claims 30-34 incorporates the elements of independent claim 29 and therefore is patentable over Curry in view of Tai and Wang for at least the same reasons. Claim 34 also is patentable over Curry in view of Tai and Wang for the same additional reasons explained above in connection with claim 7".

In re, since *a prima facie* case has been established that claims 1 and 7 are obvious over the cited references, and independent claim 29 recites elements in corresponding to claim 1 and claim dependent claim 7 recites elements in corresponding to claim 34, both claims 29 and 34 are obvious over the cited references

and not patentable. Each of claims 30-34 incorporates the elements of independent claim 29 and therefore is not patentable.

With respect to the arguments, “**Rejection of claims 8 and 9 under 35 U.S.C. §103(a)**”, pages 23-25, Appeal Brief.

Appellant argues, “In col. 18, lines 53-57, Lapstun teaches that "Because the printing is bi-level, the input image should be dithered or error-diffused for best results." This disclosure does not disclose or suggest anything whatsoever about error diffusion halftoning grayscale data that is fed into a halftone generator of the type disclosed in Curry, which halftone generator selects preprogrammed halftone cells from a lookup table based on the values of the grayscale data and bitmap codes. Therefore, one skilled in the art would not have had any apparent reason to combine the teachings of Curry and Lapstun in the manner proposed by the Examiner. To the contrary, one skilled in the an would have not been motivated to combine the reference teachings in this way because the error diffusion halftoning would not have served any apparent useful purpose because the output of Curry's halftone generator would not be affected; in particular, the output would still be a series of preprogrammed halftone cells (see col. 4, lines 1-5).”

In re, the examiner disagrees the above statements. Giving the fact that a halftone image is a binary image and error diffusion is a type of halftoning. Having the fact that halftone cells 20, 22 and 24 are produced from dot patterns forming different

shapes (col 4, lines 6-21, Curry' 636) and is fed to . One ordinary skill in the art would have been motivated to modify Curry' 636 reference for both claims 8 and 9 to include error diffusion for producing halftone cells or blocks since doing so would improve halftoning quality by distributing errors or the differences of attributes into each image cell or block.

With respect to the arguments "**Rejections of claims 12-20 and 35-38 under 35 U.S.C. §103(a)**", pages 25-29, Appeal Brief.

With respect to claim 12, Appellant argues, "Contrary to the Examiner's position, Wang '971 does not disclose or suggest any of the "partitioning", "identifying", and "extracting" elements of claim 12.

In re, the examiner disagrees with applicant's arguments made above.

Regarding claim 12, limitations recite, "**A method of extracting information embedded in a halftone image, the method comprising: accessing a bi-level bit map; partitioning the halftone image into a plurality of image blocks; using the bitmap to select at least some of the blocks; identifying a code word sequence in the selected blocks; and extracting the information from the code word sequence**".

The examiner takes the position that Wang' 971 discloses the "partitioning", "identifying", and "extracting" elements of claim 12 in Figs. 1, 6, 7 and 11, and col 1, line 61 to col 2, line 4, col 4, lines 1-28, col 4, lines 29-44, and col 7, lines 1-24:

- In Fig. 1, Wang' 971 discloses a halftone image with embedded watermark.

- In Fig. 6, Wang' 971 discloses a set of phase transition tiles.
- In Fig. 7, Wang' 971 discloses an embedded character using the phase transition tiles of Fig. 6.
- In Fig. 11, Wang' 971 discloses a functional block diagram of a watermark retrieval device according to the invention.
- In col 1, line 61 to col 2, line 4, Wang' 971 discloses "Invisible watermark retrieval depends generally on the pixel-to-pixel comparison between a bitmap of a halftone image and the bitmap of a halftone image having a certain shift relative to itself. In some areas the bitmap and its shifted version are highly correlated, i.e., near identical, while in other areas they are uncorrelated or highly "conjugate correlated," i.e., one bitmap is the inverse of the other bitmap. The pixel-to-pixel comparison between the original and the shifted bitmaps can provide a contrast between the correlated areas and other areas. Therefore, the embedded, or hidden, watermark becomes visible. Base tiles: A and B; Horizontal transition tiles: HA-B (tile with an A-to-B horizontal phase transition); Vertical transition tiles: VB-A (tile with a B-to-A vertical phase transition); A corner transition tiles: AC1, etc. B corner transition tiles: BC4, etc. The tiles 215 and 220 are the vertical transition tiles VA-B and VB-A, respectively. The tiles 235,240, 245 and 250 are the A corner transition tiles AC1, AC2, AC3, and AC4, respectively. The tiles 255, 260, 265 and 270 are the B corner transition tiles BC1, BC2, BC3 and BC4, respectively. These tiles establish the basic building blocks from which zero phase-shifted clustered halftones can be converted to .pi. phase-shifted cluster halftones. It should be noted that these tiles are illustrative in nature and can contain more than two periods in each dimension".
- In col 4, lines 1-18, Wang' 971 discloses "FIG. 6 illustrates a series of tiles which accomplish the cluster phase shift from zero phase shift to .pi. phase shift and back to zero phase shift. The tiles 200 and 210 illustrate base tiles A and B. The solid lines indicate the contour of zero phase shift, and the dash lines indicate the contour of .pi. phase shift. Both A and B base tiles 200 and 210 have a fixed period, but the A base tile 200 has a .pi. phase difference compared to the B base tile 210. The tiles 215 and 220 are the horizontal transition tiles HA-B and HB-A, respectively".

- In col 4, lines 29-44, Wang' 971 discloses "By arranging the tiles in a particular orientation, a plurality of different characters, which are eventually embedded as the watermark, can be designed. For example, FIG. 7 shows a composed stoclustic screen 300 with a watermark in the shape of a "T" 310, which has been highlighted for visualization. The halftone image created by the above-defined halftone tiles will carry the hidden "T" watermark 310 where the B base tile 210 is located. Detecting the "T" watermark 310 can be visualized by overlapping the stoclustic screen 300 shown in FIG. 7 with a checkerboard pattern in the same halftone frequency or simply using the stoclustic screen 300 with a proper shift for overlapping of portions of the stoclustic screen 300 generated from A and B base tiles 200 and 210, respectively. FIG. 2 is a black and white image created by a composed stoclustic screen revealing a large hidden letter "T" after visualization".

- In col 7, lines 1-24, Wang' 971 discloses, "FIG. 11 shows a watermark extracting device 700' for extracting embedded digital watermarks from an image according to this invention. As shown in FIG. 11, an image containing an embedded digital watermark is input from an image input device 600 over a link 610 to the watermark extraction device 700'. It should be appreciated that the image input device 600 can be any device that stores or generates an electronic version of the image. As discussed above, the system and method of this invention works equally well on images that have not been transferred to hard copy. In this case, the image is already in digital format and the image is ready for processing by the watermark extraction device 700'".

Wang' 971 discloses the "partitioning", "identifying", and "extracting" elements of claim 12. For instance, Wang '971 discloses a method of extracting information embedded in a halftone image **(Fig. 1 is a halftone image containing an embedded invisible watermark, and Fig. 11 is functional block diagram for watermark retrieval, col 7, lines 1-24)**, the method comprising: accessing a bi-level bit map ("**Invisible watermark retrieval depends generally on the pixel-to-pixel comparison between a bitmap of a halftone image and the bitmap of a halftone image having a certain shift relative to itself**", **where halftone is a binary image and one skilled in**

the art at the time the invention was made, understands that a bitmap associated with a halftone image must be a binary bitmap, in which the bit value can be either "1" or "0"; thus, "Invisible watermark retrieval" must access a bi-level bit map for watermark extraction, col 1, lines 61 through col 2, line 4); <u>**partitioning**</u> the halftone image into a plurality of image blocks (**refer to Fig. 6, halftone image is partitioned into a series of tiles, or blocks, e.g. "these tiles establish the basic building blocks from which zero phase-shifted clustered halftones can be converted to π phase-shifted cluster halftones" also indicating that halftone image is partitioned into tiles or blocks; col 4, lines 1-28)**; <u>**identifying**</u> (**e.g. detecting)** a code word sequence (**e.g. the watermark of "T" in the image blocks**) in the selected blocks (**e.g. by arranging tiles in a particular order as disclosed in Fig. 7, col 4, lines 29-44**); and <u>**extracting**</u> the information from the code word sequence (refer to **Fig. 11, a watermark extracting device 700' for extracting embedded digital watermark, col 7, lines 1-24)**.

Curry discloses the limitation of using the bitmap to select at least some of the blocks ("**The bitmap codes are based upon at least one human readable pattern to be formed within the image", col 2, lines 35-40, and "the human readable pattern 29 shown in Fig. 3 is a letter 'R'"; one skilled in the art at the time the invention was made knows to use bitmap to select some of cells, or blocks, e.g. cells 20, 22 and 24, because bitmap codes are generated from those cells, or blocks, col 4, lines 45-56**).

Having a method of extracting information embedded in a halftone image of Wang ‘971 reference and then given the well-established teaching of Curry’ 636 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of extracting information embedded in a halftone image of Wang ‘971 reference to include using the bitmap to select at least some of the blocks as taught by Curry’ 636 reference since doing so would increase the versatility of retrieve halftone cells or blocks for embedded pattern extraction in the method of extracting information embedded in a halftone image and further the technique provided could easily be established for one another with predictable results.

Thus, the examiner has established *a prima facie* case that claim 12 is obvious over the cited references.

Claims 13-20, each incorporates the elements of independent claim 12 and therefore are not patentable due to the obviousness over the cited references.

Claims 35-38, where claim 35 is an independent claim and directed to a computer-readable medium claim. Claim 35 recites identical features and incorporates the elements of claim 12. Because claim 12 is obvious over the cited reference, claims 35-38 are not patentable over the cited references.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejection should be sustained.

Respectfully submitted,

Conferees:

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